

REMARKS

This submission is provided in response to the final Office Action mailed July 14, 2006. Claims 1-15 and 17 are currently pending and under examination.

Applicants have amended Claims 1, 4-10 and 15 to more particularly point out and distinctly claim the present invention.

The hydrated alkali metal borate has been limited to hydrated potassium borate. Support for this amendment may be found, for example, on page 5, lines 29-30 of the present specification.

The ratio of the hydrated potassium borate to the hexagonal boron nitride is now in the range of about 2.1:1.0 to about 8.4:1.0. The amendment finds support in Lubricant Composition 1-3 of Example 1 of the present specification.

Claims 2 and 3 have been cancelled without prejudice.

Applicants note with appreciation the approval of Applicants' Terminal Disclaimer.

Claim Rejections – 35 U.S.C. § 103

Claims 1-7, 10-12, 14-15 and 17 are rejected under 35 U.S.C. 103(a) as being unpatentable over Salentine (U.S. Patent Number 4,717,490) in view of Kawabata et al. (U.S. Patent Number 5,173,202) and Hawley's Condensed Chemical Dictionary.

Applicants respectively must traverse the Examiner's rejection and request reconsideration in view of the following reasons.

Salentine discloses a lubricating oil containing alkali metal borate-containing lubricants (Col. 1, lines 8-10). In particular, hydrated particulate alkali metal borates are disclosed having the formula $M_{20}mB_2O_3.nH_2O$, where M is an alkali metal including sodium and potassium, m is a number from 2.5 to 4.5 (both whole and fractional), and n is a number from 1.0 to 4.8, wherein hydrated potassium triborate microparticles are preferred (Col. 1, lines 60-68 and Col. 2, lines 1-15). The mean particle size of the hydrated borate particles is less than 1 microns (Col. 2, lines 12-15). The lubricating oil to which the borate is added is any hydrocarbon-based lubricating oil or a synthetic base oil stock (Col. 4, lines 24-32), therein intrinsically including transmission oil of a lubricating viscosity. The alkali-metal borate comprises 0.1 to 20 weight percent of the lubricant composition (Col. 4, lines 33-34). Other additives that may be added to the composition include dispersants (Col. 4, lines 53-62).

Kawabata et al. is drawn to a lubricant coating material made of ceramic particles, particularly zirconium oxide, mixed with lubricating oil. While a commercial boron nitride lubricant is used in automobile engine oil B of the Examples in Kawabata et al., there is no indication in the Examples, or the entire disclosure of Kawabata et al., that a hexagonal boron nitride was used. The Examiner cites Hawley's Condensed Chemical Dictionary as indicating that boron nitride has a "hexagonal plate structure". However, it is well known that boron nitride (BN) exists in at least four predominant forms or configurations – hexagonal (hBN), rhombohedral (rBN), cubic (cBN) and wurtzite (wBN). See, for example, Kirk-Othmer Encyclopedia of Chemical Technology, Fourth Edition, Volume Four, "Refractory Boron Compounds", pages 427-429 (copy previously provided). While Kawabata et al. discloses that boron nitride may be used in lubricating oils to reduce friction on metal surfaces, there is no teaching or suggestion that the boron nitride is hexagonal. Thus, there is nothing in the disclosure of either Salentine or Kawabata et al. that suggests combining the teaching of the references and even if there was such motivation, the combination still does not provide the presently claimed invention.

Moreover, even assuming for the sake of argument that the combined teaching of the primary and secondary references did establish a prima facie case of obviousness as alleged by the Examiner, there is nothing in the cited references that suggests that the combination of an oil dispersion of a hydrated potassium metal borate and an oil dispersion of hexagonal boron nitride in a specific ratio would provide a surprising and unexpected reduction in synchronizer sticking in a manual transmission gear oil. In particular, the surprising and unexpected reduction in synchronizer sticking is demonstrated in Table 1 below which is taken from the Examples of the present specification.

Table 1

Sample	No. of Cycles with Cone on Ring Sticking	Total No. of Cycles	Anti-sticking coefficient
Base oil	5000	5000	0
Comparative Composition A	8100	8100	0
Comparative Composition B	6600	6600	0
Composition 1	1200	7500	0.84
Composition 2	1600	8710	0.82
Composition 3	300	10560	0.97

Comparative Composition A contains an oil dispersion of hydrated potassium borate and base oil. Comparative Composition B contains an oil dispersion of hexagonal boron nitride and base oil. Compositions 1-3 contain an oil dispersion of hydrated potassium borate, an oil dispersion of hexagonal boron nitride and base oil.

The above data demonstrates that the additive composition of the present invention containing both the oil dispersion of hydrated potassium borate and oil dispersion of hexagonal boron nitride in a weight ratio of hydrated potassium borate to hexagonal boron nitride in the range of about 2.1:1.0 to 8.4:1.0, as

recited in the presently amended claims, provides significant anti-sticking performance and shows a marked improvement over the comparative compositions which contain either the oil dispersion of hydrated potassium borate or oil dispersion of hexagonal boron nitride alone.

This is clearly an unexpected result which could not have been predicted from the teachings of the cited references.

Accordingly, withdrawal of the rejection of Claims 1-7, 10-12, 14-15 and 17 under 35 U.S.C. 103(a) as being unpatentable over Salentine in view of Kawabata et al. and Hawley's Condensed Chemical Dictionary, is respectfully requested.

Claims 8, 9, and 13 are rejected under 35 U.S.C. 103(a) as being unpatentable over Salentine in view of Kawabata et al. and Hawley's as applied to Claims 1-7, 10-12, 14-15 and 17 above, and further in view of Chrisope et al. (U.S. Patent Number 5,360,562).

Applicants respectively must traverse the Examiner's rejection and request reconsideration in view of the following reasons.

First, it is noted that Applicants' arguments above apply equally as well to the instant rejection.

Moreover, Chrisope et al. teaches boron-containing ashless dispersants. However, there is nothing in Chrisope et al. that teaches or suggests either hydrated potassium borate or hexagonal boron nitride or that the combination of hydrated potassium borate and hexagonal boron nitride, in the specific ratios currently claimed, would provide significant anti-sticking performance. Thus, the teaching of Chrisope et al. does nothing to overcome the deficiencies in Salentine, Kawabata et al. and Hawley's. Accordingly, there is nothing in the cited references that suggests the present invention as set forth in the presently recited claims.

Accordingly, withdrawal of the rejection of Claims 8, 9 and 13 under 35 U.S.C. 103(a) as being unpatentable over Salentine in view of Kawabata et al. and Hawley's as applied to Claims 1-7, 10-12, 14-15 and 17 above, and further in view of Chrisope et al., is respectfully requested.

CONCLUSION

It is believed that in view of the foregoing amendment and remarks, the Examiner will appreciate that the Applicants have made an unexpected discovery and a distinct advance in the art which is not disclosed or suggested by the art of record.

It is therefore respectfully solicited that the Examiner allows the claims in view of this response.

Respectfully submitted,



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